

CLAIMS

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1. An aircraft deicer panel comprising an inner support layer which is electrically insulating, an outer cover layer which is thermally conducting, a heater layer which is electrically insulating, and an electrical heating element attached to the heater layer;

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wherein the electrical heating element comprises an electrically conductive strand stitched in the heater layer in a heat-dissipating pattern.

2. A deicer panel as set forth in claim 1, wherein the heat-dissipating pattern comprises a winding path of closely spaced and sharply curved turns formed from a continuous length of the electrically conductive strand.

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3. A deicer panel as set forth in claim 1, wherein the heater layer is made from cured rubber, fiberglass, or composite adhesive.

4. A deicer panel as set forth in claim 1, wherein the electrically conductive strand is made of aluminum bronze alloy, nickel-chromium alloy, nickel-chromium-iron alloy, or nickel-copper alloy.

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5. A deicer panel as set forth in claim 1, wherein the electrical heating element further comprises a dielectric strand which is used to secure the electrically conductive strand in the heat-dissipating pattern.

6. A deicer panel as set forth in claim 1, wherein the electrically conductive strand forms a series of linear stitches on a breezeside of the heater layer.

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7. A deicer panel as set forth in claim 6, wherein the electrical heating element further comprises a dielectric strand forming a series of linear stitches on a bondside of the heater layer.

5 8. A deicer panel as set forth in claim 7, wherein the electrically conductive strand and the dielectric strand interlock between adjacent stitches.

9. A deicer panel as set forth in claim 1, further comprising a thermal conducting layer which is electrically insulating and which is positioned between the heater layer and the outer cover layer.

10. In combination, an aircraft and a deicer panel as set forth in claim 1, the deicer panel being secured to an ice-susceptible member of the aircraft.

11. A combination as set forth in claim 10, wherein the ice-susceptible member is a wing of the aircraft.

12. In combination, an aircraft and a deicer panel as set forth in claim 1 secured to each wing of the aircraft.

15 13. A method of making the aircraft deicer panel of claim 1, said method comprising the steps of:
stitching the electrically conductive wire into the heater layer in the heating-dissipating pattern; and
20 joining the stitched heater layer to the inner support layer and the outer cover layer.

14. A method as set forth in claim 13, wherein said stitching step is performed by a sewing machine.

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15. A method as set forth in claim 14, wherein said stitching step comprises programming the sewing machine to automatically stitch the heat dissipating pattern.

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16. A method of making an aircraft deicer panel, comprising the steps of:

providing an inner support layer which is electrically insulating, an outer cover layer which is thermally conducting, and a heater layer which is electrically insulating;

10 stitching an electrically conductive strand in the heater layer in a heat-dissipating pattern; and

joining the inner support layer, the heater layer, and the cover layer together.

15 17. A method as set forth in claim 16, further comprising the step of positioning a thermal conducting layer which is electrically insulating between the heater layer and the outer cover layer.

18. A method as set forth in claim 17, wherein said stitching step comprises stitching a winding path of closely spaced and sharply curved turns from a continuous length of the electrically conductive strand to form the heat-dissipating pattern.

20 19. A method as set forth in claim 18, wherein said stitching step comprises using a dielectric strand to secure the electrically conductive strand in the heat-dissipating pattern.

25 20. A method as set forth in claim 19, wherein said stitching step comprises forming a series of linear stitches on a breezeside of the heater layer with the electrically conductive strand.

21. A method as set forth in claim 20, wherein said stitching step comprises forming a series of linear stitches on a bondside of the heater layer with a dielectric strand.

5 22. A method as set forth in claim 21, wherein said stitching step comprises interlocking the electrically conductive strand with the dielectric strand to separate adjacent stitches.

10 23. A method as set forth in claim 16, wherein said stitching step comprises programming a sewing machine to automatically stitch the heat dissipating pattern.

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